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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,466	08/25/2003	Jason A. Janesky	CML00378CR	5085

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EXAMINER

NGUYEN, THINH T

ART UNIT PAPER NUMBER

2818

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/648,466

Applicant(s)

JANESKY ET AL.

Examiner

Thinh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6-14 and 33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-14 and 33 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

This is in response to Applicant's Amendment filed 01/31/2005

Note that the figures and reference numbers referred to in this Office Action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

1. Claims 1-2,4,6-14, and 33 are pending in the Application.

Claim Objections

2. Claim 4 are objected for its dependence on cancelled claim 3. Correction is required.
3. Applicant's amendments to independent claim 1 have necessitated new grounds of rejection for claims 1-2,4,6-14,33 See MPEP § 706.07(a).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

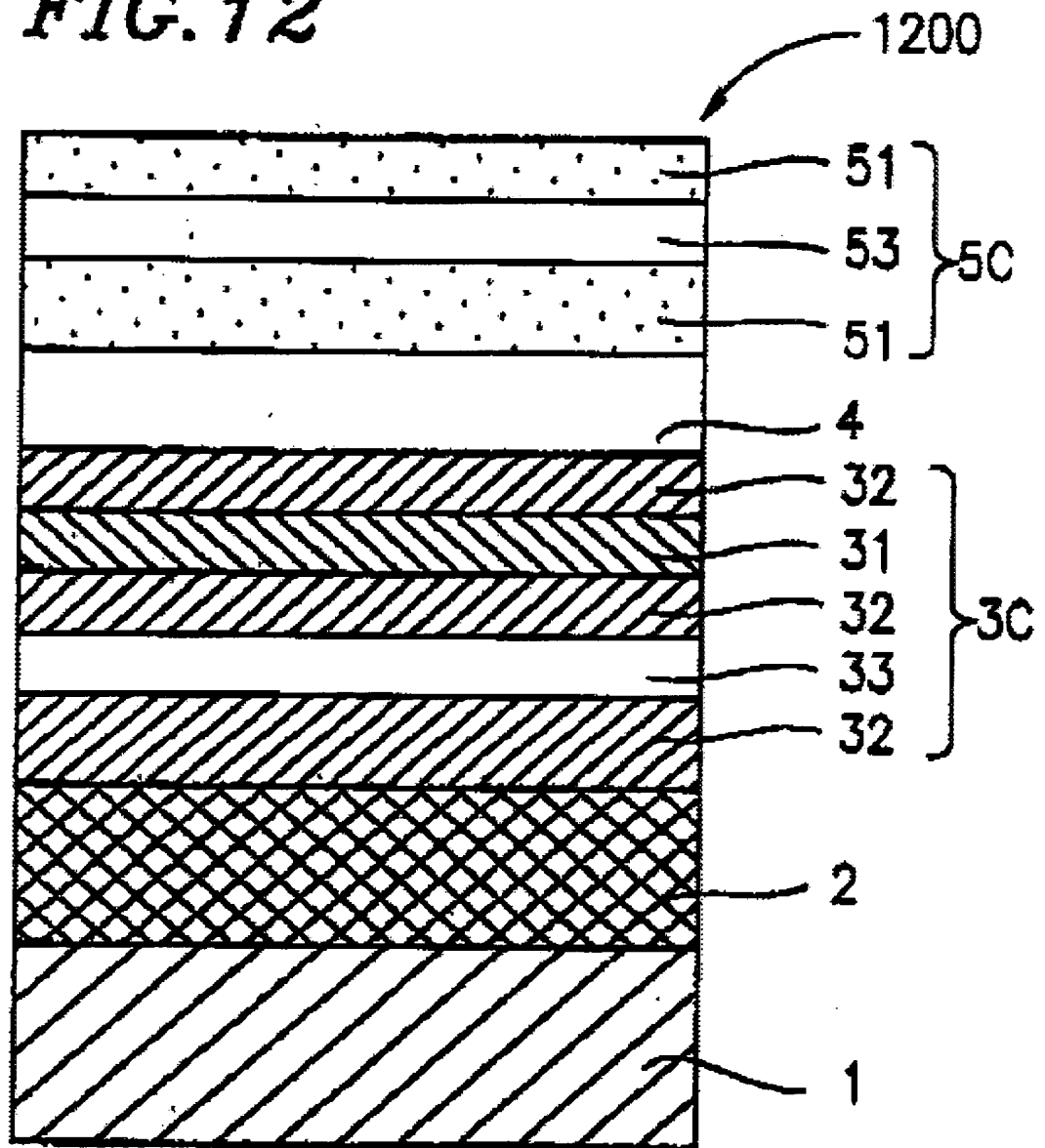
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1,6,7-11 are rejected under 35 U.S.C. §102(e) as being anticipated by Sakakima et al. (US Patent 6,567,246) or Savtchenko(US patent 6,545,906).

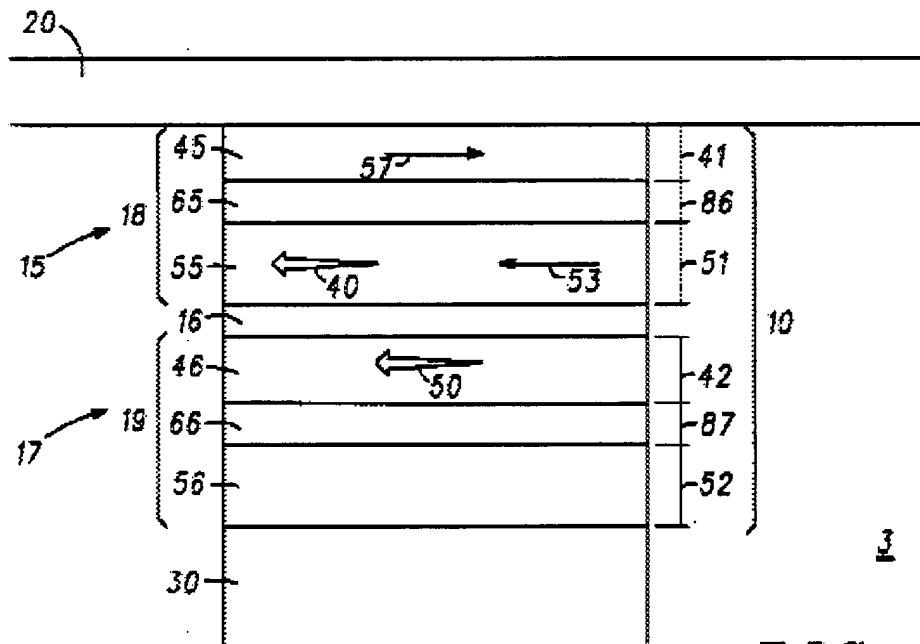
REGARDING CLAIM 1

Sakakima discloses (the abstract, fig 12,column 3 lines 45-50) a multi-state, multi-layer magnetic memory device, comprising: a nonmagnetic spacer region with a surface (fig 12 layer 4); and a free magnetic region positioned adjacent to the surface of the nonmagnetic spacer region, the free magnetic region including a first magnetic layers having a first thickness (fig 12 layer 51 (a)) ; and a second magnetic layer (fig 12 layer 12 (b)) positioned adjacent to the nonmagnetic spacer region the second magnetic layer having a second thickness that is greater than the first thickness

FIG. 12



similarly Savtchenko (fig 1, column 2 lines 38-47) discloses the same invention. Noted that even though Savtchenko does not mention specifically the relative thickness of two layer 45 and 55, on fig. 1 , clearly layer 55 is thicker than layer 45.



REGARDING CLAIM 6

Sasakima et al. (the abstract, fig 12) disclose a magnetic memory device wherein the free magnetic region includes at least one layer of an anti- ferromagnetic coupling spacer material (fig 12 layer 53).

Similarly, Savtchenko et al. (fig 1, column 2 line 38-47) disclose the same invention.

RREGARDING CLAIM 7

Sasakima et al. (the abstract, fig 12, and column 13 lines 60-64) disclose a magnetic memory device wherein the anti-ferromagnetic coupling spacer material includes at least one of copper (Cu), Silver (Ag) or ruthenium (Ru).

Similarly, Savtchenko et al. (claim 28, column 6 line 2) disclose the same invention.

REGARDING CLAIM 8

Sasakima et al. (the abstract, fig 12, column 12 lines 10-14) disclose a magnetic memory device wherein the free magnetic region includes at least one of nickel (Ni), iron (Fe), cobalt (Co) or combinations thereof.

Similarly, Savtchenko et al. (fig 1, free layer 15, column 5 lines 54-56, the abstract) disclose the same invention.

REGARDING CLAIM 9

Sasakima et al. (the abstract, fig 12 , free region 5C) disclose a magnetic memory device wherein the free magnetic region includes a synthetic anti-ferromagnetic material region including N ferromagnetic layers which are anti-ferromagnetically coupled where N is a whole number greater than or equal to two.

Similarly, Savtchenko et al. (fig 1, free layer 15, the abstract) disclose the same invention.

REGARDING CLAIM 10

Sasakima et al. (the abstract, fig 12 , free region 5C) disclose a magnetic memory device wherein each N ferromagnetic layer is anti-ferromagnetically coupled by sandwiching a layer of an anti-ferromagnetic coupling material (fig 12 layer 53) between each adjacent ferromagnetic layer in the N ferromagnetic layers.

Similarly, Savtchenko et al. (fig 1, free layer 15, the abstract) disclose the same invention.

REGARDING CLAIM 11

Sasakima et al. (the abstract, fig 12) disclose a magnetic memory device wherein a fixed magnetic region (fig 12 layer 3C) is positioned on the opposed surface of the nonmagnetic spacer region (fig 12 layer 4).

Similarly, Savtchenko et al. (fig 1, layer 46, the abstract) disclose the same invention.

6. Claim 13-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Sakakima et al. (US patent 6,567,246).

REGARDING CLAIM 13

Sakakima et al. (the abstract, fig 12 fig 7B, layer 5B, column 3 lines 45-50, column 18 lines 39-40) disclose a multi-state, multi-layer magnetic memory device comprising: a nonmagnetic spacer region with a surface and an opposed surface; a free surface of the magnetic region positioned adjacent to the nonmagnetic spacer region, the free magnetic region including a plurality of magnetic layers; wherein a free magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region and wherein the nonmagnetic spacer is a conductive material including at least one of copper (Cu), chromium (Cr), silver (Ag), and gold (Au).

REGARDING CLAIM 14

Sakakima et al. (the abstract, fig 8, fig 12) disclose a magnetic memory device wherein one of the N ferromagnetic layer of the synthetic anti-ferromagnetic material region that is

positioned adjacent to the surface of the nonmagnetic spacer is at least as thick as any of the other N ferromagnetic layers which comprise the synthetic anti-ferromagnetic material region.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. §102(e) as being anticipated by Sakakima et al. (US Patent 6,567,246) or as an alternative rejected under 35 U.S.C. 103(a) being obvious under Sakakima et al. (US Patent 6,567,246).

Noted that even though Sakakima does not disclose that the second thickness is greater than 40 angstroms or 4 nanometer his disclosure that the free layer thickness is 1 to 10 nanometer (Sakakima column 12 line 12 columns 25-30) that the spacer layer that belong to the free layer thickness (layer 52 or 53) is about 2 nanometer or less, the range of the second layer 51 (b) on fig 12 should be about grater than 4 nanometers or 40 angstroms.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 4 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Sasakima et al (US patent 6,567,246) in view of Slaughter et al. (US patent 6,205,052)

REGARDING CLAIM 4

Sasakima et al. (the abstract, fig 12) disclose all the invention except is silent about the magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region in the plurality of magnetic layers is of a material having improved growth characteristics on the nonmagnetic spacer or of amorphous material.

Slaughter et al. (claim 2, fig 4 layer 28 “”, column 7 line 7-8) teach how to make a amorphous free layer that promote growth characteristics, It would have been obvious to one of ordinary skill in the art the time the invention was made to complement the teachings by Sasakima et al. with the teachings by Slaughter et al. in order to come up with the invention of claim 4

The Rationale is as the following:

A person skilled in the art at the time the invention was made would have been motivated to reduced the topological coupling between the free magnetic layer and the fixed layer as suggested by Slaughter et al. in their abstract to improve the device Sasakima et al.

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasakima et al (US patent 6,567,246) in view of Parkins et al. (US patent 6,166,948)

REGARDING CLAIM 12

Sasakima et al(the abstract, fig 12) disclose all the invention except for the use of aluminum oxide ,aluminum nitride, or silicon oxide as non-magnetic spacer region. Parkins et al.,however; teach (fig 3A, the title, the abstract, column 4 line 50) how to fabricate a magnetic memory device wherein the non-magnetic spacer region is aluminum oxide.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teachings by Sasakima et al with the teachings by Parkins et al., in order to come up with the invention of claim 12.

The rationale is as the following:

A person skilled in the art at the time the invention made would have been to improve the device invented by Sasakima et al from the teachings by Parkins to expand the market for more profitability

12. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasakima et al (US patent 6,567,246) in view of further remark.

REGARDING CLAIM 33

Sasakima et al disclose all the invention except for a specific thickness of the second layer. This feature, however, is considered obvious since it has been held that where all the general conditions of a claim are disclosed in prior art, discover the optimum or workable ranges involves only routine skill in the art.

A person skilled in the art at the time the invention was made would have been able using his routine design skill and the teachings by Sasakima in order to come up with claims 33 with the motivation of improving the device.

13. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- US patent 6,611,453 by Ning disclosed self-aligned cross point MRAM device.

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15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose telephone number is 571-272-1790.

The examiner can normally be reached on 9.00 am- 6.00 pm Monday to Friday..


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on 571-272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Thinh T Nguyen

TTN

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David Nelms
Supervisory Patent Examiner
Technology Center 2800